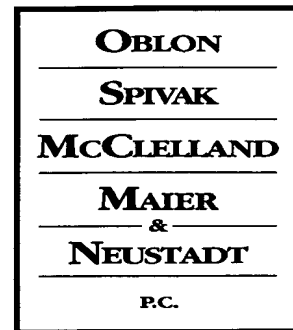




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ATTORNEYS AT LAW

RE: Application Serial No.: 09/544,289
Applicants: Takayuki HIYOSHI
Filing Date: April 6, 2000
For: OPTICAL WRITE APPARATUS
Group Art Unit: 2861
Examiner: HAI CHI PHAM

SIR:

Attached hereto for filing are the following papers:

REQUEST FOR RECONSIDERATION
VERIFICATION OF TRANSLATION
VERIFIED ENGLISH TRANSLATION OF PRIORITY JAPANESE PATENT APPLICATION
NO 11-100177

Our credit card payment form in the amount of \$0.00 is attached covering any required fees. In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, including any fees required under 37 C.F.R. 1.136 for any necessary Extension of Time to make the filing of the attached documents timely, please charge or credit the difference to our Deposit Account No. 15-0030. Further, if these papers are not considered timely filed, then a petition is hereby made under 37 C.F.R. 1.136 for the necessary extension of time. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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Verification of Translation

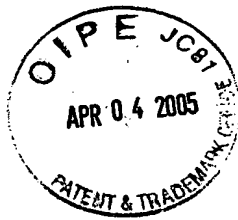
I, Tadashige Itoh, the translator of the attached document, do hereby certify that to the best of my knowledge and belief the attached document is a true English language translation of Japanese Application No. 11-100177 filed in the Japanese Patent Office on April 7, 1999.

Signed, April 4, 2005


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English translation of Japanese Patent Application No.
11-100177

[Filing date] April 7, 1999
[Name of the Invention] Image write apparatus
[Name of the Inventor] Takayuki Hiyoshi
[Applicant] Ricoh Company

[Specification]

[Name of the Invention] Image write apparatus

[Claims]

1. An image writing device comprising:

a plurality of light emitting diode array units having substrates where a plurality of light emitting diode arrays are mounted,

wherein the plurality of the light emitting diode array units are shifted from each other in the aligning direction of the light emitting diodes;

the adjacent light emitting diode array units are connected via a connecting member; and

write dot switching points of the adjacent light emitting diode array units, a fixing point for fixing one of the adjacent light emitting diode array units to the connecting member, and a fixing point for fixing the other of the adjacent light emitting diode array units to the connecting member, are aligned in a same line in a aligning direction of the light emitting diode arrays.

2. An image writing device comprising:

three or more light emitting diode array units having substrates where a plurality of light emitting diode arrays are mounted,

wherein the plurality of the light emitting diode array units are shifted from each other in the aligning direction of the light emitting diodes;

the adjacent light emitting diode array units are connected via a connecting member; and

write dot switching points of the light emitting diode array unit adjacent to other light emitting diode array units, write dot switching points on the light emitting diode array units both adjacent to another light emitting diode array unit, the fixing points for fixing the light emitting diode array unit to the connecting member, and the other fixing points for fixing the light emitting diode array unit to the connecting member re aligned in a same line in a aligning direction of the light emitting diode arrays.

3. The image writing device as claimed in claim 1 or 2,

wherein a part of each of the substrates protrudes from each corresponding holding member which hold the substrate; and

the protruding parts of the substrates are fixed to the connecting members.

4. The image writing device as claimed in any claim of claims 1 through 3, further comprising:

an array position adjusting unit that adjusts relative positions of the substrates adjacent to each other in the aligning direction of the light emitting diodes.

5. The image writing device as claimed in claim 4,

wherein the array position adjusting unit connects a pair of connecting members adjacent to each other in the aligning direction of the light emitting diodes via an adjusting screw;

one of the pair of connecting members is fixed to one of the adjacent substrate and the adjacent light emitting diode array unit; and

the other one of the pair of connecting members is fixed to the other one of the adjacent substrate and the adjacent light emitting diode array unit.

[Detailed Explanation of the Invention]

[0001]

[Technical Field of the Invention]

The present invention relates to an image write apparatus used for a printer, digital copier, or the like whereby light is irradiated on a photosensitive body by plural light emitting array units so that a latent image is written on the photosensitive body.

[0002]

[Conventional Arts]

An image write apparatus wherein light is irradiated on a photosensitive body by a light emitting array unit so that a latent image is written on the photosensitive body, has been used

[0003]

However, in a case of a light emitting diode array unit using a substrate having a length of approximately 1 m and using light emitting diodes aligned at 400 dpi (a dot pitch of $63.5 \mu\text{m}$), it is costly to produce it because the accuracy needs to be maintained in the entire length of the light emitting diode array unit, the size of the apparatus becomes large, and the yield decreases.

In addition, if one light emitting diode is broken in such a long light emitting diode array unit, the entire light emitting diode array unit needs to be replaced. This causes increase of the cost.

[0004]

To solve the above-mentioned problems, light emitting diode array units include the substrates that are relatively small in length, having a length of A3 size paper, for instance, has been used. The light emitting diode array units are arranged in the longitudinal direction of the light emitting diodes, thereby forming one long light emitting diode array unit.

[0005]

[Problems to be Solved by the Invention]

However, the light emitting diode array units arranged in the longitudinal direction of the light emitting diodes, thereby

forming one long light emitting diode array unit, has a problem in the dot switching positions at each seam between the adjacent substrates.

More specifically, as the dot pitch at 400 dpi is 63.5 μm , a dot pitch error needs to be restricted to 5 less than 5 μm to avoid black and white lines appearing in an image.

[0006]

At each seam portion, connecting the light emitting diode array units simply by connecting members is not sufficient to prevent the ambient temperature from varying and the light emitting diodes from generating heat. The inner temperature in an image forming apparatus employing the optical write apparatus including the light emitting diode array units rises to heat the seam portions between the substrates. As a result, the connecting members expand due to the heat, and the dot pitch at each seam portion is changed.

[0007]

That is, if the distance between the seam portions of the connecting members connecting the light emitting diode array units is 20 mm, the material of the connecting members is iron having a linear expansion coefficient of 0.000012/deg and the temperature rise is 30 degrees, a pitch shift of 7.2 μm will be caused by the temperature rise alone.

Taking the accuracy in the initial positioning of the light emitting diode array units into account, the dot pitch error at the seam portions will become large enough to cause defects in an image.

[0008]

The object of the present invention is to provide an image apparatus wherein the dot pitch at the seam portions between light emitting diode array units does not become large enough to cause image defects, even when an environmental temperature of the apparatus is changed or an inside of the apparatus is changed due to heat generation of the LED or the like of the light emitting diode array units

[0009]

[Means for Solving the Problems]

The above object of the present invention is achieved by an image writing device comprising: a plurality of light emitting diode array units having substrates where a plurality of light emitting diode arrays are mounted, wherein the plurality of the light emitting diode array units are shifted from each other in the aligning direction of the light emitting diodes; the adjacent light emitting diode array units are connected via a connecting member; and write dot switching points of the adjacent light emitting diode array units, a fixing point for fixing one of the adjacent light emitting diode array units to the connecting member, and a fixing point for fixing the other of the adjacent light emitting diode array units to the connecting member, are aligned in a same line in a aligning direction of the light emitting diode arrays.

[0010]

The above object of the present invention is achieved by an image writing device comprising: three or more light emitting diode array units having substrates where a plurality of light emitting diode arrays are mounted, wherein the plurality of the light emitting diode array units are shifted from each other in the aligning direction of the light emitting diodes; the adjacent light emitting diode array units are connected via a connecting member; and write dot switching points of the light emitting diode array unit adjacent to other light emitting diode array units, write dot switching points on the light emitting diode array units both adjacent to another light emitting diode array unit, the fixing points for fixing the light emitting diode array unit to the connecting member, and the other fixing points for fixing the light emitting diode array unit to the connecting member re aligned in a same line in a aligning direction of the light emitting diode arrays.

[0011]

A part of each of the substrates protrudes from each corresponding holding member which hold the substrate; and the protruding parts of the substrates are fixed to the

connecting members.

[0012]

The image writing apparatus further includes An array position adjusting unit that adjusts relative positions of the substrates adjacent to each other in the aligning direction of the light emitting diodes.

The array position adjusting unit connects a pair of connecting members adjacent to each other in the aligning direction of the light emitting diodes via an adjusting screw, one of the pair of connecting members is fixed to one of the adjacent substrate and the adjacent light emitting diode array unit, and the other one of the pair of connecting members is fixed to the other one of the adjacent substrate and the adjacent light emitting diode array unit.

[0013]

[Embodiment of the Invention]

The following is a description of embodiments of the present invention, with reference to the accompanying drawings.

FIG. 1 is a plan view illustrating the relative positional relationship among a plurality of light emitting diode array units of an image write apparatus in accordance with the present invention. FIG. 2 is a perspective view of the image write apparatus and a photosensitive drum.

This image write apparatus comprises two light emitting diode array units 1A and 1B having substrates 2a and 2b, respectively, on which a plurality of light emitting diodes (not shown) are arranged in the direction of the arrow A. The light emitting diode array units 1A and 1B are shifted from each other in the direction of the arrow A, and are connected by a connecting member 3 as shown in FIG. 1.

[0014]

In this image write apparatus, dot switching points Dc1 and Dc2 on the substrates of the respective light emitting diode array units 1A and 1B, a fixing point Fp1 for fixing the connecting member 3 to the light emitting diode array unit 1A, and a fixing point Fp2 for fixing the connecting member 3 to

the light emitting diode array unit 1B are aligned in a line L1.

[0015]

The substrate 2a of the light emitting diode array unit 1A is fixed to a housing 4a by a screw 5 in the line L, and the housing 4a is fixed to the connecting member 3 by a screw 6 at the fixing point Fp1.

The substrate 2b of the light emitting diode array unit 1B fixed to a housing 4b by a screw 7 in the line L, and the housing 4b is fixed to the connecting member 3 by a screw 8 at the fixing point Fp2.

Therefore, centers of the screws 5, 6, 7, and 8 and dot switching points Dc1 and Dc2 are arranged in the line L.

[0016]

The fixation between the substrate 2a and the housing 4a, the fixation between the housing 4a and the connecting member 3, the fixation between the substrate 2b and the housing 4b, and the fixation between the housing 4b and the connecting member 3 may be carried out by means other than screws.

The above-mentioned fixations may be carried out by means such as adhesion or caulking with rivets.

The substrates 2a and 2b, the connecting member 3, and the housings 4a and 4b do not need to be made of a special material or a material having a certain linear expansion coefficient.

[0017]

As shown in FIG. 2, each of the light emitting diodes aligned on the substrates 2a and 2b of the light emitting diode array units 1A and 1B faces a photosensitive drum 10. The light emitting diodes irradiate the photosensitive drum 10 so as to form a desired latent image on the photosensitive drum 10.

[0018]

As described before, a conventional image write apparatus having a plurality of light emitting diode array units that are simply connected has the problem that the dot intervals at the write dot switching points on the substrates vary with a temperature rise in the light emitting diode array units. Those

varied dot intervals at the write dot switching points often result in a defective image.

[0019]

That is, as shown in FIG. 3, for instance, where there is a distance L1 from the write dot 20 switching points Dc1 and Dc2 to the fixing points of a connecting member 13 to housings 14a and 14b and the substrates 2a and 2b, the substrate 2a expands by a value determined by multiplying a predetermined linear expansion coefficient by the distance L1 and the temperature rises. As a result, the write dot switching point Dc1 shifts to the left in FIG. 3.

[0020]

In this case, the substrate 2b also expands, and the write dot switching point Dc2 accordingly shifts to the left in FIG. 3. However, since linear expansion coefficients and temperature distributions vary among the components, the write dot switching points Dc1 and Dc2 relatively drift from the original locations.

[0021]

For ease of explanation, the substrate 2a and the housing 14a are fixed to the connecting member 13 by a screw, and the substrate 2b and the housing 14b are screwed to the connecting member 13 by a screw in FIG. 3. However, where the connecting member 13 is fixed to the housing 14a by a screw, while the housing 14a is fixed to the substrate 2b by a screw at another location, the relative drift of the write dot switching points Dc1 and Dc2 becomes even greater.

[0022]

Furthermore, in reality, a track pitch error corresponding to the relative drift of the write dot switching points Dc1 and Dc2 becomes even greater due to the initial positioning accuracy of the light emitting diode array units 11A and 11B as well as the expansion of each component.

Therefore, if the dot pitch error exceeds 5 pm, which will cause vertical black and white lines in an image, the image corresponding to the seam portion of the write dot switching

points Dc1 and Dc2 becomes defective.

[0023]

However, in the image write apparatus of the present invention, the image corresponding to the seam portion of the write dot switching points Dc1 and Dc2 does not become defective, because the write dot switching points Dc1 and Dc2, the fixing point Fp1 for fixing the housing 4a to the connecting member 3, the fixing point Fp2 for fixing the housing 4b to the connecting member 3, the position for fixing the substrate 2a to the housing 4a 10 by the screw 5, and the position for fixing the substrate 2b to the housing 4b by the screw 7 are aligned in the line L.

[0024]

That is, when the write dot switching points Dc1 and Dc2, the fixing point of the substrate 2a to the housing 4a, and the fixing point of the substrate 2b to the housing 4b are aligned in the line L, the distance Ld from the write dot switching points Dc1 and Dc2 to the fixing points of the connecting member 13 to the housings 14a and 14b and the substrate 2a and 2b becomes zero. Accordingly, the dot pitch error corresponding to the relative drift of the write dot switching points Dc1 and Dc2 also becomes zero.

[0025]

The dot pitch error is caused by expansion of the substrates 2a and 2b or the housings 4a and 4b due to a temperature rise. The expansion of the substrates 2a and 2b or the housings 4a and 4b can be calculated by multiplying the linear expansion coefficient by the distance L1 (See FIG. 3) and the temperature rise.

[0026]

However, in the optical write apparatus shown in FIGS. 1 and 2, the distance L1 is zero, because the write dot switching points Dc1 and Dc2 on the substrates 2a and 2b, the fixing point Fp1 for fixing the housing 4a to the connecting member 3, the fixing point Fp2 for fixing the housing 4b to the connecting member 3, the point for fixing the substrate 2a to the housing 4a by the screw 5, and the point for fixing the substrate 2b

to the housing 4b by the screw 7 are aligned in the line L.
[0027]

Accordingly, the write dot switching points Dc1 and Dc2 on the substrates do not drift from the line L with a temperature rise, so that the relative positions of the write dot switching points Dc1 and Dc2 do not shift in the direction of the arrow A. Thus, a high-quality image can be obtained.

[0028]

FIG. 4 is a plan view of an image write apparatus having three light emitting diode array units 25 that are shifted from each other. FIG. 5 is a perspective view of the image write apparatus of FIG. 4 and a photosensitive drum. In FIGS. 4 and 5, the same components as in FIGS. 1 and 2 are denoted by the same reference numerals.

[0029]

As shown in FIG. 4, the optical write apparatus comprises three (or more) light emitting diode array units 1A, 1B, and 1C having substrates 2a, 2b, and 2c. The light emitting diode array units 1A, 1B, and 1C are shifted from each adjacent other, and connected by connecting members 3A and 3B.

[0030]

In FIG. 4, the write dot switching points on the substrate of the light emitting diode array unit 1B adjacent to the light emitting diode array units 1A and 1C are denoted by Dc2 and Dc3, the write dot switching points on the respective substrates of the light emitting diode array units 1A and 1C both adjacent to the light emitting diode array unit 1B are denoted by D1 and D4, respectively, the fixing points for fixing the housings 4a and 4b of the light emitting diode array 20 units 1A and 1B to the connecting member 3A are denoted by Fp1 and Fp2, and the fixing points for fixing the housings 4b and 4c to the connecting member 3B are denoted by Fp3 and Fp4. The fixing points Fp1 and Fp2 and the write dot switching points Dc1 and Dc2 are 25 aligned in a line L2, while the fixing points Fp3 and Fp4 and the write dot switching points Dc3 and Dc4 are aligned in a line L3.

[0031]

The housing 4a of the light emitting diode array unit 1A is fixed to the connecting member 3A by the screw 6 at the fixing point Fp1, while the connecting member 3A is fixed to the housing 4b of the light emitting diode array unit 1B by the screw 8 at the fixing point Fp2.

Furthermore, the housing 4b of the light emitting diode array unit 1B is fixed to the connecting member 3B by a screw 51 at the fixing point Fp3, while the connecting member 3B is fixed to the housing 4c of the light emitting diode array unit 1C by a screw 52 at the fixing point Fp4.

[0032]

In addition, the substrate 2a is fixed to the housing 4a of the light emitting diode array unit 1 by the screw 5, while both ends of the substrate 2b are fixed to the housing 4b of the light emitting diode array unit 1B by screws 7 and 53. Further, a substrate 2c is fixed to the housing 4c of the light emitting diode array unit 1C by a screw 54.

The centers of the screws 5, 6, 7, and 8, and the write dot switching points Dc1 and Dc2 are all aligned in the line L2.

The centers of the screws 51, 52, 53, and 54, and the write dot switching points Dc3 and Dc4 are all aligned in the line L3.

[0033]

The fixation of the substrate 2a to the housing 4a, the fixation of the substrate 2b to the housing 4b, the fixation of the substrate 2c to the housing 4c, the fixation of the housings 4a and 4b to the connecting member 3A, and the fixation of the housings 4b and 4c to the connecting member 3B are not limited to the screw fixation.

But, adhesion fixation or caulking fixation with rivets can be employed, as long as the relative positions of those components can be fixed.

[0034]

In addition, the substrates 2a, 2b, and 2c, the connecting members 3A and 3B, and the housings 4a, 4b, and 4c do not need

to be made of a special material having a certain linear expansion coefficient.

The fixed point between the substrate 2a and the housing 4a and the fixed point between the left end of the substrate 2b and the housing 4b may be aligned in a line other than the line L2. Likewise, the fixed point between the right end of the substrate 2b and the housing 4b and the fixed point between the substrate 2c and the housing 4c may be aligned in a line other than the line L3.

[0035]

Meanwhile, as shown in FIG. 6, the substrates 2a, 2b, 2c of light emitting diode array units 1A', 1B', and 1C' are made of a glass epoxy resin having a linear expansion coefficient of 0.000013/deg. The housings 4a, 4b, and 4c are made of an aluminum material having a linear expansion coefficient of 0.000024/deg. Taking the linear expansion coefficient differences into account, both ends of the housing 4b of the light emitting diode array unit 1B' are fixed directly (or via connecting members) to the housings 4a and 4c of the light emitting diode array units 1A' and 1C' by the 20 screws 55 and 56. Here, the temperature rise is 30 degrees.

[0036]

The substrate 2b and the housing 4b of the light emitting diode array unit 1B' are fixed to each other by a screw 57 at the left end of the light 25 emitting diode array unit 1B'. The substrate 2a and the housing 4a of the light emitting diode array unit 1A' are fixed to each other by a screw 58 at one point, while the substrate 2c and the housing 4c of the light emitting diode array unit 1C' are fixed to each other by a screw 59 at one point.

[0037]

In this case, the length of the light emitting diode array unit 1B' in the longitudinal direction is the same as the length of A3 size paper. As a result, the rightmost end dot on the substrate 2b, furthest from the fixed point of the substrate 2b to the housing 4b, is drifted from the housing 4b by $(0.000024 - 0.000013) \times 300 \text{ mm} \times 30 \text{ deg} = 99 \text{ } \mu\text{m}$.

[0038]

With such drifts of the dots, it is impossible 15 to restrict the dot pitch error to less than 5 μm , which is the largest possible pitch error not to cause black and white vertical lines in an image.

In reality, there are temperature distributions in the substrates 2a, 2b, and 2c, and the housings 4a, 4b, and 4c, and the drifts 20 of the dots become even more complicated.

[0039]

However, as described with reference to FIGS. 4 and 5, even if the light emitting diode array units 1A, 1B, and 1C each having the width of A3 size paper constitute an optical write apparatus having the width of A0 size paper, the relative positions of the write dot switching points Dc1 and Dc2 on the respective substrates of the adjacent light emitting diode array units 1A and 1B, and the write dot switching points Dc3 and Dc4 on the respective substrates of the light emitting diode array units 1B and 1C do not drift in the aligning direction of the light emitting diodes (the direction of the arrow A of FIG. 4). Thus, an excellent image can be obtained.

[0040]

FIG. 7 is a plan view of an image write apparatus having substrates protruding from the respective housings. FIG. 8 is a perspective view of one of the substrate of the image write apparatus of FIG. 7.

As shown in FIG. 7, the image write apparatus of this example comprises three light emitting diode array units 1A", 1B", and 1C" (it may comprise two or more than three of light emitting diode array units). In the light emitting diode array units 1A", 1B", and 1C", substrates 22a, 22b, and 22c are fixed to housings 24a, 24b, and 24c in such a manner that a part of each of the substrates 22a, 22b, and 22c protrudes from each corresponding housing.

[0041]

The protruding portions of the substrates 22a and 22b of the light emitting diode array units 1A" and 1B" are fixed to each

other by the connecting member 33A with the screws 34 and 35.

Likewise, the protruding portions of the substrates 22b and 22c of the light emitting diode array units 1B and 1C are fixed to each other by the connecting member 33B with the screws 36 and 37.

[0042]

The centers of the screws 34 and 35 and the write dot switching points Dc1 and Dc2 are aligned in a line L5 that is perpendicular to the aligning direction (indicated by the arrow A) of the light emitting diodes.

The centers of the screws 36 and 37 and the write dot 10 switching points Dc3 and Dc4 are aligned in a line L6 that is also perpendicular to the arrow A.

[0043]

The fixation of the substrates 22a and 22b to the connecting member 33A and the fixation of the substrate 22b and 22c to the connecting member 33B are not limited to the screw fixation.

Also, the substrates 22a, 22b, and 22c, and the connecting members 33A and 33B, and the housings 24a, 24b, and 24c do not need to be made of a special material having a certain linear expansion coefficient.

[0044]

As described so far, even if the light emitting diode array units 1A", 1B", and 1C" arranged in the aligning direction of the light emitting diodes constitute an image write apparatus, the relative positions of the write dot switching points Dc1 and Dc2 on the respective substrates 22a and 22b of the adjacent light emitting diode array units 1A" and 1B", and the relative positions of the write dot switching points Dc3 and Dc4 on the respective substrates 22b and 22c of the light emitting diode array units 1B and 1C do not drift in the aligning direction of the light emitting diodes (the direction of the arrow A of FIG. 7). Thus, an excellent image can be obtained.

[0045]

Normally, if the linear expansion coefficient differences between the substrates 22a, 22b, and 22c, and the housings 24a,

24b, and 24c are large, or if the differences in temperature distribution are large, the substrates are bent due to the differences in expansion between the substrates and the housings. In this image write apparatus, on the other hand, the substrates 22a, 22b, and 22c are not bent, because the substrate 22a and 22b of the light emitting diode array units 1A and 1B are fixed directly to the connecting member 33A while the substrates 22b and 22c of the light emitting diode array units 1B" and 1C" are directly 20 fixed to the connecting member 33B. (The substrates 22a, 22b, and 22c are movably and partially fixed to the housings 24a, 24b, and 24c, respectively.).

Hence, since the relative position of the write dot switching points on the substrates of the plurality of light emitting diode array units do not drift in the aligning direction of the light emitting diodes, an excellent image with no black and white vertical lines can be obtained. Also, the substrates do not need to be fixed to each other by a force great enough to overcome the expansion difference between the substrates and the housings.

[0046]

FIG. 9 is a plan view of an image write apparatus provided with an array position adjusting unit. In this figure, the same components as in FIG. 1 are denoted by the same reference numerals.

The image write apparatus comprises two adjacent light emitting diode array units 1A and 1B having the substrates 2a and 2b, and an array position adjusting unit 40 that adjusts the relative positions of the substrates 2a and 2b in the aligning direction of the light emitting diodes (the direction of the arrow A).

[0047]

The array position adjusting unit 40 comprises a pair of connecting members 43 and 44 separately connected by an adjusting screw 45. The connecting member 43 is fixed to the housing 4a of the light emitting diode array unit 1A by the screw

6, while the connecting member 44 is fixed to the housing 4b of the 5 light emitting diode array unit 18 by the screw 8.
[0048]

Since the light emitting diode array units 1A and 1B can be brought into contact with each other or separated from each other by adjusting the rotation amount of the adjusting screw 45, the relative positions of the write dot switching points Dc1 and Dc2 can be adjusted as desired.

Although the array position adjusting unit 40 provided with the adjusting screw 45 is shown in FIG. 9, any other structure can be employed as an array position adjusting unit as long as it can perform fine adjustment.

[0049]

According to the present invention, the following effects can be achieved.

According to the image writing apparatus as claimed in claim 1, even if an environmental temperature of the apparatus is changed or an inside of the apparatus is changed due to heat generation of the light emitting array units, the relative positions of the write dot switching points of the neighboring plural light emitting array units do not shift in the arrangement direction of the light emitting array. Thus, a high-quality image can be obtained without causing black and white vertical lines.

[0050]

According to the image writing apparatus as claimed in claim 2, even if the optical write apparatus is large in size comprising more than three light emitting diode array units arranged in the aligning direction of the light emitting diodes, the relative positions of the write dot switching points between the adjacent light emitting diode array units does not change in the aligning direction of the light emitting diodes. Thus, images having no black and white lines can be obtained.

[0051]

According to the image writing apparatus as claimed in claim 3, since the substrates are directly fixed each other by the

connection means, the substrates are not bent due to the linear expansion coefficient difference between the substrates and the housings. Accordingly, excellent images can be obtained, and the substrates do not need to be reinforced to overcome the linear expansion coefficient difference between the substrates and the housings.

[0052]

According to the image writing apparatus as claimed in claim 4, the relative positions of the write dot switching points of the adjacent light emitting diode array units can be adjusted as desired. Even if the image write apparatus is large in size having a plurality of light emitting diode array units arranged in the aligning direction of the light emitting diodes, the image write apparatus can maintain high accuracy.

[0053]

According to the image writing apparatus as claimed in claim 5, an array position adjusting unit can be easily constituted by adjusting screws. The relative positions of the respective write dot switching points of the adjacent light emitting diode array units can be finely adjusted by simply tightening or loosening the adjusting screws.

[Brief Description of Drawings]

FIG. 1 is a plan view illustrating the relative positional relationship among a plurality of light emitting diode array units of an image write apparatus in accordance with the present invention.

FIG. 2 is a perspective view of the optical write apparatus and a photosensitive drum.

FIG. 3 illustrates a problem caused by a distance between the dot switching points and fixed points for fixing adjacent light emitting diode array units.

FIG. 4 is a plan view of an image write apparatus comprising three light emitting diode array units.

FIG. 5 is a perspective view of the image write apparatus of FIG. 4 and a photosensitive drum.

FIG. 6 illustrates a problem that the relative positions of the dot switching points of adjacent light emitting diode array units are shifted due to a temperature rise.

FIG. 7 is a plan view of an image write apparatus in which each substrate partially protrudes from the housing.

FIG. 8 is a perspective view of a light emitting diode array unit of the image write apparatus of FIG. 7.

FIG. 9 is a plan view of an image write apparatus provided with an array position adjusting unit.

[Explanation of Numerical Marks]

1A, 1B, 1C, 1A', 1B', 1C', 1A'', 1B'', 1C'', 11A, 11B: Light emitting diode array unit

2a, 2b, 2c, 12a, 12b, 22a, 22b, 22c: Substrate

3, 3A, 3B, 12, 33A, 33B: Connection member

4a, 4b, 4c, 12a, 12b, 24a, 24b, 24c: Housing

40: Array position adjustment means

45: Adjustment screw

[Abstract]

[Object]

To prevent situation that the dot pitch at the seam portions between light emitting diode array units becomes large enough to cause image defects when an temperature is increased

[Means for solving problems]

Write dot switching points Dc1 and Dc2 of the adjacent light emitting diode array units 1A and 1B, a fixing point Fp1 for fixing one of the adjacent light emitting diode array unit 1A to the connecting member 3, and a fixing point Fp2 for fixing the light emitting diode array unit 1B to the connecting member 3, a position for fixing a substrate 2a to a housing 4a by a screw 5, a position Fp1 for fixing the housing 4a to the connection member 3, a position for fixing a substrate 2b to a housing 4b by a screw 7, and a position Fp2 for fixing the housing 4b to the connecting member 3, are aligned in a line L.

[Selected drawing] FIG. 1